WEATHER ON THE NORTH PACIFIC OCEAN

By WILLIS E. HURD

Atmospheric pressure.—Winter conditions of pressure set in over northern waters of the North Pacific during October 1940, with a deep LOW covering the Gulf of Alaska. At Kodiak the mean of the month was 995.6 millibars (29.4 inches), which is 6.4 millibars (0.19 inch) below the October normal. At Juneau the minus departure from normal was almost as great, 5.1 millibars (0.15 inch). The lowest pressure at Kodiak was 968 millibars (28.58 inches), on the 27th. This was one of the lowest corrected readings of the month in northern waters, but was equaled by a corrected reading made on the American M. S. *Aurora*, near 50° N., 176° E., on the 5th.

In middle latitudes a moderate high pressure region extended, on an average, from the central California coast westward to beyond Midway Island. Pressures were moderately above normal over the western Pacific, except in the Mariana Islands and vicinity, where they were below normal.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure at sea level, North Pacific Ocean October 1940, at selected stations*

Station	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Millibars	*Millibars*	*Millibars*		*Millibars*	
Barrow	1,012.8	−0.7	1,030	17	997	1
Dutch Harbor	1,001.8	−2.3	1,022	2	972	27
St. Paul	1,003.3	−0.1	1,021	4	978	7
Kodiak	995.6	−6.4	1,012	5	968	27
Juneau	1,006.4	−5.1	1,027	1	983	19
Tatoosh Island	1,013.9	−2.4	1,025	11	994	23
San Francisco	1,015.9	−0.4	1,023	18	1,007	1
Mazatlan	1,011.2	+0.7	1,014	14, 18	1,008	1
Honolulu	1,014.6	−1.3	1,019	20	1,008	1
Midway Island	1,017.5	+0.6	1,025	1, 26	1,003	21
Guam	1,008.8	−1.7	1,016	22	1,000	6
Manila	1,010.3	+1.2	1,015	28	1,006	2
Hong Kong	1,014.2	0.0	1,022	26	1,006	1
Naha	1,015.3	+2.8	1,023	27	1,011	1, 3, 5, 7
Titijima	1,013.6	+0.7	1,023	27	1,008	4
Petropavlovsk	1,010.8	+1.7	1,023	29	987	27

NOTE.—Data based on 1 daily observation only, except those for Juneau, Tatoosh Island, San Francisco, and Honolulu, which are based on 2 observations. Departures are computed from best available normals related to time of observation.

Extratropical cyclones and gales.—Cyclonic disturbances were frequent in northern waters, particularly over the northeastern part of the ocean, where LOWS affected the weather conditions over the greater part of the month. The available observations indicate a greater degree of gale frequency resulting from cyclonic activity in this section than along the western part of the northern steamer routes. Yet it is difficult to gage the storminess in upper east longitudes, owing to scarcity of reports. The most important gale reported was of full hurricane force, encountered by the American M. S. *Aurora* in a deep cyclone south of the western Aleutians. Farther west, between the Kurile Islands and longitude 165° E., the American M. S. *Clevedon* had rough weather from the 25th to 27th, with gales which attained their greatest strength, force 10, on the 27th, lowest barometer 982.4 millibars (29.01 inches), in 48° N., 163° E.

In the extreme northern part of the Gulf of Alaska a force 9 gale was reported on the 13th. A southeasterly gale of force 10, with barometer down to 992.2 millibars (29.3 inches), was encountered by the American S. S. *Denali* in the channel near Ketchikan, Alaska, on the 19th. A little to the westward, in the open gulf, a gale of force 9 was met by the U. S. A. T. *Chirikof* on the 22d, while on her way southward from Seward.

Along the trans-Pacific routes, the reported gales in west longitudes occurred to the northward of the 40th parallel and to the eastward of 160° W. These for the most part were massed within the area 40° to 50° N., 130° to 150° W., during the 11th, and from the 17th to 23d. The heaviest gales, both of force 10, occurred on the 11th and 18th. The earlier was experienced by the American S. S. *Michigan* near 52° N., 158° W.; the latter by the American S. S. *China Arrow*, with lowest barometer 967.2 millibars (28.56 inches), uncorrected, in 45° N., 145° W. During the 22d and 23d gales of force 8 to 9 occurred within the region, 40° to 50° N., 140° to 150° W., and in addition, on the 23d, the American S. S. *Waipio*, a short distance out from Portland, was caught in a southeaster of force 9, then raging along the Oregon coast.

Typhoons and other tropical cyclones.—Much severer weather occurred as a result of tropical rather than of extratropical cyclones in October. Subjoined is a report by the Reverend Bernard F. Doucette, S. J., of the Weather Bureau Observatory, Manila, P. I., on four typhoons of the month. At least three of these cyclones were of great wind intensity along some parts of their paths. They formed unusually far to the eastward of the ordinary courses of observed typhoons, and one at least followed a wholly unique path. Additional notations may be made regarding these three storms.

In the earliest, that of September 29 to October 5, the strongest known winds, according to our records, occurred on the date of earliest known formation. Near 21° N., 160° E., the American S. S. *Pan Royal* ran into a southwest gale of force 11, lowest barometer 996.6 millibars (29.43 inches). As the cyclone moved northwestward, the Norweigian M. S. *Corneville* next encountered it on September 30 and Oct. 1. This vessel's lowest barometer was 29.44 inches, with highest wind, east-northeast, force 10, in 24°40′ N., 154° E.

In the typhoon of October 13–17, Father Doucette notes that it formed about 1,000 miles east of Guam, and that the S. S. *President Coolidge* encountered its hurricane strength on the 16th, near 34° N., 163½° E. Observations received from the American S. S. *Oregonian* indicate that the storm, through falling pressure and slowing rising winds, was noticeable as early as the 12th. At 7 p. m. of that date, in 18°28′ N., 157°20′ E., the ship's barometer was lowest, 991.9 millibars (29.29 inches), but with only moderate wind. Her strongest gale, south, force 9, occurred near noon of the 13th, near 19° N., 159° E. On the 15th the S. S. *President Cleveland*, well north of the storm center on that date, had an east-northeast gale of force 10, with barometer only moderately depressed. During the night of the 16th–17th, however, the American S. S. *City of Dalhart* encountered the full force of the storm in 34°35′ N., 163°53′ E., with a north-northeast hurricane and a low barometer of 981 millibars (28.97 inches). The storm was now proceeding northward; it was lost to observation on the 18th, but it is probable that a gale of force 9, experienced by the Japanese M. S. *Nankai Maru*, near 43° N., 162° E., on the 19th, may have resulted from the disturbance near its final stage.

The most intense typhoon of the month was that which struck Wake Island with hurricane force on the 19th. The cyclone pursued a northeasterly course, and on the 20th the American S. S. *Volunteer* came within the sphere of intense winds, experiencing southerly gales of force 11 during the early afternoon near 23° N., 168° to 169° E. Farther eastward, near 25° N., 179° E., the American S. S. *City of Alma* had southerly gales of force 8. From 8:42 to 9:38 p. m. of the 20th the American S. S. *Illinoian* steamed through the eye of the cyclone, with calm to light variable winds. At 9:42 p. m. the ship entered the zone of hurricane velocities from north-northwest to

northwest. Her barometer at that moment, in 25°06′ N., 170°36′ E., had reached its lowest point with a reading of 935.3 millibars (27.62 inches).

During the afternoon of the 20th, the American S. S. *Steel Traveler*, west-bound in the near vicinity of the *Illinoian*, missed the typhoon center at closest by no more than 25 miles at 5 p. m. according to a special report furnished by Third Officer Richard H. Evans, ship's master, Capt. L. Smith. By 11 a. m., quoting from the report, "Visibility was reduced to approximately 1 mile and was getting less all the time * * *. At 1300 the barometer read 29.41 (corrected), wind 12 and E. x N, heavy, long, confused seas and swells of mountainous height from the E. and ENE. Visibility about 100 feet. A consensus of opinion put the wind at 115 m. p. h. At 1500 the storm center was about 30 miles south of ship's position—latitude 24°54′ N., longitude 169°40′ E. At 1600 the barometer fell to 29.04 and the wind shifted to the NE., velocity at 120 miles. Vessel hove to and considerable damage being done by wind and precipitous seas." The ship's lowest barometer was 980 millibars (28.94 inches) at 4:30 p. m. Later in the afternoon the wind shifted to north and then to northwest, and near midnight began to moderate.

During the 21st the cyclone swung into an east-northeastward direction and crossed to the northward of Midway Island, where a barometer reading of 1,003 millibars (29.62 inches) was reported. On the 21st the American M. S. *City of Dalhart*, near the northern edge of the storm, had an east-northeast gale of force 8, barometer 1,008.1 millibars (29.77 inches). From all indications, the cyclone, weakened to a mere depression, reached its extreme eastward location near 28° N., 168° W., on the 22d, then curved into a southwesterly course, finally completing its disintegration barely to the eastward of Midway Island.

In the southeastern Pacific at least two tropical cyclones occurred, one well at sea on the 6th to 11th; the other, west of Central America on the 26th to 28th. Data are insufficient in either case to little more than touch upon the histories of the two disturbances.

The earlier was observed on the 6th by the American S. S. *Yaka*, Honolulu toward Balboa. The ship entered the disturbed area in the forenoon, and by early afternoon was encountering heavy northeasterly winds which attained force 11 near 3 p. m. At about 4 p. m. the wind had changed to east, force 11, with barometer down to 990.5 millibars (29.25 inches). The storm was apparently moving in a northwesterly direction, but there are no further observations to confirm it until the 11th, when the American S. S. *Steel Trader* ran into northwesterly winds which reached force 8 at 6 p. m., with barometer depressed to 1,007.1 millibars (29.74 inches). The wind later shifted to southwest, as the disturbance passed.

In the second cyclone, the American S. S. *West Ira*, south-bound, entered the disturbed region with northeasterly winds early on the 26th. By noon the barometer had fallen to 1,004.1 millibars (29.65 inches), and the wind had risen to force 9 from the northwest, near 12° N., 92° W., later falling off and changing to west-southwest. On the 27th the Japanese S. S. *Rakuyo Maru*, north-bound toward Manzanillo, entered the westerly winds of the storm in the early afternoon. By 6:30 p. m., in 11°19′ N., 96°15′ W., the wind had risen to force 10 from the west southwest and the barometer had fallen to its lowest point, 982.7 millibars (29.02 inches). At 7 p. m. the wind had shifted to south, force 10, with rising barometer. Gales, however, continued on ship until well into the 28th, after which the storm disappeared from observation.

Tehauntepecers.—In the Gulf of Tehuantepec a north-northwest gale of force 8 occurred on the 17th, and a northeast wind of force 7, on the 19th, both in connection with high pressure to the northward.

Fog.—Fog was reported on 3 days in the upper open Pacific. That of the 5th occurred in the midst of the violent cyclone then central over the western Aleutians. Fog was also observed on the 11th near 20° N., 128° W., within the region of the tropical cyclone of that date. Fog was reported on 2 days each off the Washington, Oregon, and Lower California coasts, and on 10 days off the California coasts.

TYPHOONS AND DEPRESSIONS OVER THE FAR EAST

By BERNARD F. DOUCETTE, S.J.

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Typhoon, September 29–October 5, 1940.—This typhoon seems to have formed far to the southeast of Guam and then intensified as it moved in a northwesterly direction to the regions about 120 miles north of Guam. There it changed to a westerly course, proceeding about 800 miles, when its movement was checked on October 3. The next day it inclined to the north, afterwards recurving northeast, but weakening to a low-pressure area. After October 5, no trace of the storm could be found. Upper winds over Guam during this period changed from the northwest to the southwest quadrant with velocities about 20 to 40 kilometers per hour, hardly ever reaching 50 kilometers per hour. There were few ascents higher than 3,000 meters due to adverse weather conditions and clouds.

Typhoon, October 12–15, 1940.—A typhoon formed over the China Sea on October 12, about 180 miles southeast of the Paracels weather station. The storm proceeded along a west-northwesterly course and entered Indo-China between Vinh and Thanhoa during the early morning hours of October 15. It was a small center which moved over the water parallel to the coast line. It disappeared over the continent on October 16. On October 13, at 2 p. m., 747.4 millimeters (996.4 millibars) with south-southeast winds force 8 was reported from the Paracels. Values slightly above 750 millimeters (999.9 millibars) were reported from Indo-China coastal stations during these days. There seem to have been no serious destructive effects as a result of this storm.

Pilot-balloon observations show a surge of air from the northeast quadrant a few days before the formation of this storm. The southwesterly current, however, was very weak, judging from the few ascents received from Saigon, Indo-China, and Thailand stations, the velocities seldom reaching the value of 40 kilometers per hour and generally being less than 30 kilometers per hour.

Typhoon, October 13–17, 1940.—A few ships' observations showed the presence of a typhoon central about 1,000 miles northeast of Guam. It appeared to be recurving after a northwesterly movement. On October 16, the S. S. *President Coolidge* came under the influence of this storm. The ship was en route from Honolulu to Yokohama and passed close to and north of the typhoon center. The minimum pressure recorded on ship was 738.6 millimeters (984.7 millibars), with north winds, force 12, position, latitude 33°48′ N., longitude 163°30′ E. At the present writing, nothing is known concerning the formation of this storm and its movement after October 17.

Typhoon, October 19–21, 1940.—A typhoon passed very close to Wake Island during the forenoon hours of October 19. Winds of hurricane force from the northeast quadrant with pressure at 726.0 millimeters (967.9 millibars) were reported October 19, 6 a. m. Manila time (18th, 2200 G. C. T.).